

IDAHO DEPARTMENT OF FISH & GAME

Joseph C. Greenley, Director

Annual Performance Report

to

Idaho Power Company



IPC-17. Evaluation of Spring Chinook Salmon
Emigration, Harvest and Returns to
Rapid River Hatchery, 1977

IPC-13. Report of Operations at Rapid River
Hatchery, 1977

Period Covered: 1 October 1976 to 30 September 1977

by

Evan M. Parrish
Fish Hatchery Superintendent III

March, 1978

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	1
OBJECTIVES	3
TECHNIQUES USED	3
Marking and Evaluation of Downstream Migrants	3
Evaluation of Upstream Migrants and Inventory of Fish Populations	3
Hatchery Operations, Disease Control Measures, Conversion Rates	4
Harvest Information	4
Brook Year and Age Class Composition	4
McCall Summer Chinook	5
Rapid River Summer Chinook	5
FINDINGS	5
Spring Chinook - 1975 Brood Year	5
Enumeration, Marking and Evaluation of Downstream Migrants	5
Size and Poundage Released, Conversion Rate	6
Smolt Survival	6
Spring Chinook - 1976 Brood Year	7
Enumeration	7
Rearing Problems - Disease and Treatments Used	7
Spring Chinook - Adult Returns	11
Arrival Dates	11
Enumeration	11
Nitrogen Bubble Damage and Other Injuries	16
Timing from Bonneville Dam to the Rapid River Trap	17
Holding Pond Losses, Treatment of Adults	17
Spawning Operations and Enumeration of Eggs Obtained	18
Disposition of Spawmed-out Carcasses	18
Marked Fish	19
Distribution of Eggs, Eye-up Percentages	22
Harvest	22
Summer Chinook - Returns to Rapid River	24
Steel head	24
Inventory of Miscellaneous Species in Rapid River	24
Dolly Varden	24
Whitefish	24
Other Species	25
McCall Summer Chinook Enumeration (Funded by the U.S. Army Corps of Engineers)	25
Spawntaking, Enumeration of Eggs, Eye-up and Percentages	25
Hatchery Improvements - 1977	25
Public Relations	25
ACKNOWLEDGEMENTS	26

LIST OF TABLES

	<u>Page</u>
Table 1. Distribution of surplus Rapid River spring chinook salmon fingerlings, 1977	8
Table 2. Chemical analyses of Rapid River water for metals	10
Table 3. Returns of spring chinook salmon to Rapid River Hatchery, percentage of returns, survival to spawning, and enumeration of eggs, fry and smolts produced, with size and poundage	12
Table 4. Length frequencies of salmon entering the Rapid River trap, 1970-1977	14
Table 5. Summary of the returns to Rapid River Hatchery by age class of spring chinook smolts released	20

ANNUAL PERFORMANCE REPORT

State of Idaho

Project No. IPC-17 & IPC-13

Name: Evaluation of Spring Chinook Salmon

Emigration, Harvest and Returns to Rapid River Hatchery, 1977

Report of Operations at Rapid River Hatchery, 1977

Period Covered: 1 October 1976 to 30 September 1977

ABSTRACT

At the end of the 1976 fish year, we had 3,217,765 fish from the 1975 brood on hand at the hatchery. We lost 46,843 fish prior to planting or emigration in the spring of 1977. We planted 249,750 smolts in the South Fork of the Clearwater River, and 2,921,172 smolts were allowed to emigrate naturally from our rearing ponds. We marked 254,945 of the fish that emigrated down Rapid River with an adipose fin clip, and coded wire tag. No downstream survival estimates were available, but passage conditions appeared poor.

During the 1977 fish year, we liberated or planted 4,411,879 fish in all size categories, that weighed 93,089 kg (205,227 lb). The overall average length of the smolts was 134 mm (5.3 in) and about 95% of the smolts exceeded 110 mm (4.3 in) in length at release. We fed 127,314 kg (280,680 lb) of Oregon Moist Pellets to produce these fish, a conversion rate of .62 kg (1.37 lb) per .45 kg (1 lb) of feed. The average cost of .45 kg (1 lb) of fish was \$.365 for fish food only, and when labor and operational costs were included, .45 kg (1 lb) of fish cost \$.966.

On 1 October 1976 we had 5,511,360 eggs from the 1976 brood on hand. We shipped 501,878 eyed eggs to Mackay Hatchery, and had 5,009,482 eggs for rearing here. We lost 2.1% of the fish as eggs or fry. In the summer we ponded or planted 4,571,306 fish, a survival of 93.2% of the original number. Some gill damage was seen in the raceways, but cause could not be determined. Metal sampling in the water was instituted.

Record low water flows and high water temperatures precipitated an outbreak of Bacterial Gill Disease that caused losses of 457,830 fish in rearing pond number two. An additional 450,199 fish emigrated from that pond during the outbreak. We used Cutrine Plus to successfully treat the disease. Part of the dead fish were replaced with fish being reared for the Columbia River Program, as 312,200 were transferred back to Idaho Power Company rearing ponds. We have 2,437,996 fish on hand for spring release in 1978.

The first adult spring chinook salmon arrived at the Rapid River trap on 30 April 1977. The peak of the run occurred on 23 May, when 1,065 adults and 5 jacks were removed from the trap. All fish arriving after 30 June were classified as summer chinook and released to spawn in Rapid River. We took 8,181 spring chinook salmon from the trap; 437 jacks (third-year fish) and 7,744 adults

(fourth- and fifth-year fish). We placed 7,011 adults in our holding ponds, and planted out 595 adults that were excess to our holding capacity in the Little Salmon River and 161 adults in the South Fork of the Clearwater River. We planted 303 jacks in the Little Salmon and 17 in the Clearwater. The run was 5.3% jacks, 86.9% fourth-year fish and 7.8% fifth year or older. About 10.2% of the spring chinook crossing Bonneville Dam were of Rapid River Hatchery origin, and 31.4% of the Lower Granite Dam count springs were similarly Rapid River origin.

Nitrogen Bubble Disease injuries declined, while fisheries related injuries increased dramatically. Approximately 24.3% of the fish that arrived at the trap had been gillnetted, gaffed or snagged in some portion of their bodies. All adults received a malachite green treatment on open wounds and an injection of Erthromycin Phosphate at the trap, as well as a second injection in the pond some 30 days later.

We lost 10.8% of the fish that were held for spawning, and less than 6% were lost to Kidney Disease (KD). Less than 1% of the fish that survived to spawn had KD. We spawned 3,745 females and fertilized their eggs with the milt from 2,455 males. The females averaged 3,762 eggs each. The total number of eggs taken was 14,160,330. Excess eggs were distributed throughout the state as needed. Several fish that had been marked prior to emigration as smoltswere recovered. We had a 98% egg survival to eye-up.

Sport fishermen harvested an estimated 2,119 salmon in the Little Salmon and Salmon rivers that were of Rapid River Hatchery origin in 1977. We estimated that slightly over 8,200 anglers participated in this fishery. The Indian fishery was more intensive than any past year. We estimated the Indian harvest at 2,010 fish. Fishermen (Indian and non-Indian) harvested 33.6% of the fish destined for the hatchery, the highest percentage ever recorded.

We released 135 adult and 51 jack summer run chinook into Rapid River. We also passed 60 steelhead, 212 Dolly Varden, 19 whitefish, 1 cutthroat trout, 9 rainbow trout and 3 squawfish.

We hauled 706 summer chinook from Little Goose Dam and held them for spawning. We lost 228 females and 166 males prior to spawning. A total of 615,762 eggs were collected from 154 females and 613,502 eyed eggs were shipped to McCall Hatchery.

Several improvements to the hatchery were made and about 42,000 persons visited the hatchery in 1977.

Author:

Evan M. Parrish
Fish Hatchery Superintendent III

OBJECTIVES

To evaluate the survival and rate of movement of hatchery smolts past the migration barrier on Rapid River, Whitebird, Ice Harbor Dam and The Dalles Dam.

To evaluate the survival back to the hatchery of jack and adult spring chinook salmon by brood years.

To inventory all fish by species entering the upstream trap on Rapid River.

To estimate the harvest by sportsmen of hatchery reared spring chinook salmon in the Salmon and Little Salmon rivers and the Indian harvest in the Little Salmon and Rapid rivers.

To enumerate the native, summer chinook salmon run into Rapid River.

To report all functions and operations being carried out at Rapid River Hatchery, disease problems encountered, numbers and poundage of fish released, eggs taken and distribution of eggs, fingerlings and smolts from the hatchery.

To report any improvements to the hatchery, the number of visitors annually and public presentations made.

TECHNIQUES USED

Marking and Evaluation of Downstream Migrants

The coded wire tagging crew marked a total of 254,948 smolts with an adipose fin clip and a coded wire tag embedded in the snout of the fish. One group was marked the first week of December, 1976 and the second group in late February and early March, 1977. The marking required 640 hours, an average of 398 fish per hour worked. The tag loss on the fish marked in December was only .67% when checked in early February. This marking represented 8% of the total of 3,170,922 smolts released from this hatchery.

The National Marine Fisheries crew also marked 50,475 of the smolts with an "R" freeze brand on the right anterior position. This marking was accomplished in early March, 1977. These marks were used to evaluate the downstream survival of Rapid River stock to various points downriver.

Evaluation of Upstream Migrants and Inventory of Fish Populations

We installed the upstream migrant trap on 23 April 1977, somewhat later than normal due to delays in construction and repair work, and operated it until 8 August 1977. All upstream migrant fish were examined at the trap and numbers, size and species were recorded. This inventory included all fish in excess of 203 mm (8 in) in length. From 16 May 1977 to 18 July 1977 a summer aide was stationed at the trap to assist hatchery personnel with the sorting,

measuring and counting of all species of fish present.

During the entire trapping period, hatchery personnel examined all fish in the trap for tags and marks. At spawning time, National Marine Fisheries Service (NMFS) personnel examined all spawned-out carcasses for marks and measured all fish to determine age class by length frequency distribution. The snouts of all fish were removed and checked for coded wire tags. Excess fish over the 7,000 pond capacity were measured, checked for coded wire tags, examined for tags and marks and released in either the South Fork of the Clearwater River or the Little Salmon River. Floy tags were attached to all planted fish so that they would be readily identifiable if they returned to the trap in order to insure against an inflated inventory of new arrivals. All jacks were examined and either planted or ponded at the hatchery and checked at spawning time.

Hatchery Operations, Disease Control Measures, Conversion Rates

Records were kept on normal hatchery operations by hatchery personnel. All diseases were noted and treatments used and their success in combating disease problems were recorded as they occurred.

Conversion rates were obtained from hatchery planting slips and feed records.

All adult pond mortalities were examined and autopsied. University of Idaho and hatchery personnel both assisted in these examinations and in making the Erthromycin Phosphate injections at the trap and 30 days later in the ponds (a part of the cooperative Kidney Disease control study).

Harvest Information

For the first time in 3 years, an open sports season was held on spring chinook salmon in Idaho. Harvest information was obtained by using a standard creel census. We checked sports fishermen on 2 days per week, 1 weekday and 1 weekend day. Angler counts were made 4 times per day and the rest of the census day was spent interviewing anglers. These figures were then expanded to encompass the entire week and the season.

The Indian harvest in the Little Salmon and Rapid rivers was even larger than that of 1976. We estimated their catch by conducting as many interviews as possible and looking at the fish they had taken. A conference between conservation officers and hatchery personnel enabled us to report 670 fish in the Indian creel and estimate that we had seen about 33% of the catch.

Brood Year and Age Class Composition

We measured all adult and jack salmon that had entered the trap either as they were planted, as pond mortality or as post spawning carcasses. Brood year and age class composition were then determined by using length frequency distribution curves.

McCall Summer Chinook

In late June 1977, we selected 708 adult summer chinook from the ladder at Little Goose Dam on the Snake River. These adults were injected with drugs to combat disease and open wounds were treated with malachite green prior to loading by National Marine Fisheries Service crews into Corps of Engineers tanker trucks for transportation to Rapid River Hatchery. The fish were held and spawned at Rapid River Hatchery and the eggs that we obtained were eyed at Rapid River prior to transfer to McCall Hatchery for hatching and rearing. The selection and injection process was carried out by a Rapid River Hatchery man and a University of Idaho graduate student.

Rapid River Summer Chinook

All unmarked salmon entering the Rapid River trap after 29 June 1977 were examined for marks and released to spawn naturally in Rapid River. The release of summer chinook was started about 14 days earlier than in 1976. We realize that some of these fish were probably late arriving spring chinook, but since there is no valid way of differentiating these fish, all arrivals after 29 June were classed as summer run fish. Trapping was terminated on 8 August 1977, 8 days later than in 1976.

FINDINGS

Spring Chinook - 1975 Brood Year

Enumeration, Marking and Evaluation of Downstream Migrants

At the beginning of the 1977 fish year (1 October 1976) we had 3,217,765 fish (76-152 mm) from the 1975 brood year on hand that would be released in the spring of 1977. Of this total, 2,938,247 were for direct release into Rapid River to fulfill Idaho Power Company's mitigation obligation and 279,518 in the raceways were to be planted as part of the spring chinook reintroduction program in the South Fork of the Clearwater River.

When the fish emigrated from the ponds in March and April 1977, we had released 2,921,172 smolts into Rapid River that weighed 83,449 kg (183,974 lb). The fish averaged 35/kg (15.9/lb) and losses of only 17,075 fish were estimated (.58%) between 1 October 1976 and the end of emigration in April 1977. This loss was somewhat lower than the 2.2% and 2.4% in the 2 preceeding years.

We planted 249,750 smolts in the South Fork of the Clearwater River in late March and early April 1977. These fish weighed 7,552 kg (16,650 lb) and averaged 33.1 fish per kg (15 per lb). We had lost 29,768 fish (10.6%) between 1 October and planting.

No major outbreaks of disease were recorded during this period and the fish appeared to be in excellent health at the time of emigration and planting. All fish were fed a prophylactic treatment of a 4% level of Erthromycin Thiosianate in the form of Gallomycin 50 mixed in the diet in the fall of 1976 to prevent a possible outbreak of Kidney Disease. This was part of the

Kidney Disease control study and appears to be very beneficial.

None of the fish released in the Clearwater drainage were marked, but 254,945 fish that emigrated down Rapid River were marked with both a coded wire tag and adipose fin clip. One group of fish was marked the first week of December 1976 and a second group marked in February and March 1977. The marking required 640 hours of labor, an average of 398 fish per hour worked. Tag placement was very good and tag loss was less than 1% when checked in early March. The National Marine Fisheries Service also freeze branded 50,475 fish with the letter "R" in the right anterior position (NMFS designation). These fish were used to estimate downstream survival of Rapid River stocks of smolts.

Emigration from the hatchery began on 7 March 1977 and the last fish were forced from the ponds of 19 April 1977. This is consistent with past years emigration pattern. The first Rapid River smolts were recaptured at the Whitebird barge trap of 13 March, some 6 days after they were first observed leaving the ponds. All mercury vapor lights around the ponds were extinguished on 4 January 1977 to insure that the fish would be exposed to a normal photo-period for at least 6 weeks prior to normal emigration time.

Size and Poundage Released, Conversion Rate

During the 1977 fish year, we liberated or planted 4,411,879 fish that weighed a total of 93,089 kg (205,227 lb). This represents the total planted or transferred in all size categories. Of this total weight and number, 3,170,922 fish were smolts that weighed 91,001 kg (200,624 lb). A 900 fish sample was taken from the fish population on 28 March 1977 and the length of the fish varied from 97 to 156 mm (3.8-6.1 in). The overall average length was 134 mm (5.3 in) and 95% of the fish exceeded 110 mm (4.3 in) in length. This is a little larger than the fish planted in 1976 but nearly the same as the fish released in 1975. Overall uniformity in size was very good.

We fed a total of 127,314 kg (280,680 lb) of Oregon Moist Pellets, Formula II fish feed to produce 93,089 kg (205,227 lb) of planted fish at a total fish feed cost of \$75,009.76. We fed .62 kg (1.37 lb) of fish feed to produce .45 kg (1 lb) of fish flesh. The average cost of .45 kg of fish (1 lb) was \$.365 for fish feed. When all labor and operational costs were added, the cost of producing .45 kg (1 lb) of fish was \$.966. This is a slight decrease in production costs over the 1976 fish year. This production cost also compares very favorably to some of the state trout hatcheries.

Smolt Survival

National Marine Fisheries Service (NMFS) personnel monitored the timing, survival and magnitude of the movement of emigrant smolts from the Salmon, Snake and Columbia River drainages in 1977. NMFS operated barge traps at both a point above the confluence of the Little Salmon River and the Salmon River and at Whitebird, 56 km (35 mi) downriver. At the Riggins trap they captured and branded 23,479 emigrant chinook and at the Whitebird trap they captured and branded 73,329 fish. The efficiency of the traps was nearly equal and since the Whitebird trap sampled the population after the Little Salmon River

contribution (Rapid River smolts) had entered the population, it would appear that Rapid River Hatchery had contributed approximately 68% of the total emigrants from the Salmon River. NMFS estimated that 85-90% of the Rapid River Hatchery smolts passed that point (Whitebird), 2.5 to 2.6 million fish (Ron Strain, personal communication). The survival rate to that point is considered about normal from past years data. The Rapid River smolts arrived in the greatest numbers at Whitebird from 9 April to 20 April 1977 (Ron Strain, personal communication). This is also consistent with past years data. Between Whitebird and the Lower Granite Dam trap site, extremely heavy losses were encountered by all emigrating fish. About 25% of the fish marked at Whitebird and at Rapid River made it safely to the uppermost dam. They estimated that about 730,000 Rapid River smolts survived to that point. Many of the emigrating smolts were transported by NMFS trucks and barges past the lower six dams, but many fish were not recaptured. Only about 4% (117,000 from Rapid River) of the fish that were not transported survived to The Dalles Dam (Howard Raymond, personal communication). Since it is impossible at this point to estimate the impact of the transportation efforts on smolt survival, this data is presented for background information only. No estimation of total smolt survival can be accurately made at this time, but it appears that very poor water conditions may have caused heavy losses of emigrating fish.

Spring Chinook - 1976 Brood Year

Enumeration

On 1 October 1976 we had 5,511,360 eggs on hand that were produced by the adult salmon that returned in 1976. We shipped 501,878 eyed eggs to Mackay Hatchery during the month of October, leaving a total of 5,009,482 eggs and fry for our production at Rapid River. When the fish were transferred from the incubators to the raceways, we found that about 106,419 fish had been lost as eggs or fry, 2.1% of the original number of eggs.

On 26 April 1977 we moved 1,092,112 fingerlings from the raceways to the number one earthen rearing pond and on 11 May 1977 we filled the number two earthen pond with 2,117,716 fish, completing the number to be reared for Idaho Power Company mitigation releases. We planted out an additional 1,045,558 fish (Table 1) in various places statewide and kept 315,920 fish in raceways for planting as smolts in the spring of 1978 for the spring chinook reintroduction program. Of the original number of 4,903,063 fish moved to the raceways as swim-up fry, 4,571,306 fish were either ponded or planted, 93.2% survival in the raceways. On an overall basis, we planted or ponded 91.25% of the total number of eyed eggs that were kept at Rapid River. At the end of the fish year, we had 2,425,806 fish on hand for release in the spring of 1978.

Rearing Problems -- Disease and Treatments Used

The fry were again moved to the outdoor environment of the raceways when the total accumulative temperature units reached 1,650 and before they totaled 1,675. The mixture of 1/32 pellets in equal parts with starter mash was again the starting ration and good results were obtained. Some losses occurred in early spring and examination revealed some badly eroded gill filaments, but no bacteria or parasites present. It was suspected that the gill damage might be

Table 1. Distribution of surplus Rapid River spring chinook salmon fingerlings, 1977.

Planting site or hatchery	Weight		Number	Release site
	kg	lb		
University of Idaho	9.07	20	28,000	Kidney Disease Study
University of Idaho	8.16	18	19,008	Kidney Disease Study
Mackay Hatchery	544.22	1,200	226,800	Upper Salmon R. 1978
Mackay Hatchery	204.08	450	85,050	Upper Salmon R. 1978
Lolo Creek	249.43	550	104,500	Upper Salmon R. 1978
Red River Pond	2,380.95	5,250	501,600	Upper Salmon R. 1978
~S.F. Clearwater	351.47	775	80,600	Upper Salmon R. 1978
Totals	3,747.48	8,263	1,045,558	

caused by heavy metals in the water supply. Some literature suggests that in highly mineralized drainages leaching of metals occurs at nearly the same rate in both high and low water flow years, but in higher flows more dilution takes place rendering the metals less toxic to aquatic life. Both years when gill deterioration has been a problem at this hatchery were extremely low water years. Heavy deposits of both copper and zinc are found within the Rapid River drainage. In order to determine if these or other metals might be causing problems, a systematic sampling procedure was instituted by the hatchery crew, with samples being tested by Mr. Charles R. Knowles, a Geochemist and microprobe analyst with the Department of Lands, Bureau of Mines and Geology, stationed at the University of Idaho in Moscow. This could not be accomplished until 1 August and results to date have failed to conclusively prove or disprove this theory. It was noted that when the water flows in Rapid River increased with the very small runoff this spring, losses subsided and were no longer a problem. Both zinc and copper levels have varied since sampling was instituted (Table 2). Sampling will continue until we have more conclusive evidence of the effect of metals in the water supply.

The year of 1977 was a record drought year throughout the state. The lack of precipitation also had an adverse effect on this hatchery. Extremely low flows and warm water temperatures contributed to an outbreak of bacterial gill disease in rearing pond two on 1 August 1977. We estimated that 457,830 fish in pond two died of the disease during the first 2 weeks of August 1977, 15.1% of the total to be released from Idaho Power Company ponds. An additional 450,199 fish emigrated from the ponds during the disease outbreak but did not die, leaving only 1.2 million from pond two for the spring 1978 release. We transferred the fish being held in the raceways (312,000) back to the Idaho Power Company inventory to make up for some of the losses to disease, bringing the total fish available for the spring 1978 release to 2,437,996 fish at the beginning of the 1978 fish year (1 October 1977). We feel that most of the fish that left the hatchery in August will contribute very little to the return of adults from this brood year.

Since a mid-summer outbreak of Bacterial Gill Disease had never occurred prior to 1977, no treatment was readily available to control the disease. It should also be noted that the water temperature had never before exceeded 17 C (63 F) at this hatchery. On 1 August we experienced a 20.5 C (69 F) water temperature, and that higher water temperature probably made possible the rapid buildup of bacteria. After examining the fish, our pathologist suggested that we try a new chemical, Cutrine Plus, as a treatment to reduce bacteria numbers. Bioassays were run on test lots of fish under controlled conditions. The recommended dosage level was 28 g (1 oz) of Cutrine Plus for each second foot of inflow, for a 1-hour period. We placed 200 fish in a vat and introduced this level of chemical to the tank. The fish showed no distress and all fish survived. The tests were then repeated using progressively stronger dosages until some fish were distressed and died, at a rate of 142 g (5 oz) Cutrine Plus per second foot of inflow for an hour. We took gill smear slides from the general populations in pond two prior to any treatment and microscopically examined them. A large population of Myxo-bacteria was present on the gills. We then treated the pond with a level of 57-85 g (2-3 oz) of Cutrine Plus per second foot of inflow for a 1-hour period for 3 consecutive days. Gill smears after each treatment showed a significant reduction in bacteria numbers. The treatment was repeated weekly for the next 3 weeks and satisfactory results

Table 2. Chemical analyses of Rapid River water for metals.

Date	Sample number	Ag.	Cu.	Cd.	Ni.	Pb.	Zn.	Ca.
1 Aug	001	--	<0.01	0.004	--	<0.01	0.06	22.2 0
15 Aug	003	<0.01	<0.01	<0.01	<0.1	<0.1	0.2	--
22 Aug	004	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	--
29 Aug	005	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	--
5 Sept	006	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	--
12 Sept	007	<0.01	0.01	<0.01	<0.1	<0.1	0.1	--
19 Sept	008	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	--
6 Sept "	009	<0.01	<0.01	<0.01	<0.1	<0.1	< 0.1	--
3 Oct	010	<0.01	<0.01	<0.01	< 0.1	<0.1	< 0.1	--
10 Oct	011	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	--

were obtained. This chemical will undoubtedly be a useful tool in controlling future outbreaks of the disease.

The losses to the Bacterial Gill Disease will result in this hatchery releasing only 81% of the targeted 3 million smolts. This is the first time since 1969 that the release figures have not been within 10% over or under the targeted release number.

Spring Chinook - Adult Returns

Arrival Dates

The first adult spring chinook salmon arrived at the Rapid River trap on 30 April 1977. All fish arriving after 30 June 1977 were released into Rapid River to spawn naturally and were classed as summer run chinook. This cutoff date was 13 days earlier than that of 1976.

Only one fish arrived during April 1977 and no jacks were counted. May was the single largest month of arrival of adults when 4,833 new arrivals were counted as well as 33 jacks. On 23 May 1977 a new all-time 1-day trapping record was established when 1,065 adults and 5 jacks were removed from the trap. During June we trapped 3,095 adults and 384 jacks. We had spring chinook salmon arriving at the Rapid River trap for a total of 54 days in 1977 and averaged 147 fish per day during that time. The peak on 23 May was 29 days earlier than the 1976 peak, 48 days earlier than the 1975 peak and 53 days earlier than the 1974 peak. Low water conditions in 1977 allowed the fish to pass upstream much earlier than normal and the result was a much longer than normal holding period at the hatchery.

Enumeration

During April, May and June 1977 a total of 8,181 spring chinook salmon were taken from the trap on Rapid River including 7,744 adult fish and 437 jack salmon (Table 3). We placed 7,011 adult fish in the holding ponds at the hatchery, released 595 adults and 303 jacks in the Little Salmon River for the sports fishery, and 161 adults and 17 jacks in the South Fork of the Clearwater River for sports fishing and reproductive purposes. Third year fish (jacks) declined from 1,765 in 1976 to 437 in 1977, a 75% reduction. This may indicate a reduced survival to the ocean in 1975 and, therefore, a reduction in returns of fourth and fifth year fish over the next 2 years. Only 5.3% of the fish captured were in their third year of life, including 23 fish that were used for spawning (Table 4). Fish in their fourth year of life made up 86.4% of the run and numerically increased from 5,222 (64.4%) in 1976 to 7,110 in 1977. Fish in their fifth year of life or older showed a decline of nearly 57% from 1976 when 1,120 fish of this age group were captured (13.8% of the run) to 634 fish (7.8% of the run). All fish from 41 to 61 cm (16-24 in) were classed as in their third year of life, and from 61-79 cm (24-31 in) as fish in their fourth year of life. All fish in excess of 79 cm (31 in) were classed as in their fifth year of life or older.

This hatchery again made a significant contribution to the overall Columbia River and Snake River runs of spring chinook salmon. The final count of spring chinook salmon at Bonneville Dam was 119,508 fish and at Lower Granite Dam

Table 3. Returns of spring chinook salmon to Rapid Rivet. Hatchery, percentage of returns, survival to spawning, and enumeration of eggs, fry and smolts produced, with size and poundage.

Brood year	Snake R. return (adults)	Rapid R. return (adults)	Percent adults returned to smolts released	Rapid R. return (jacks)	Percent jacks returned to smolts released	Total percent returned	Mortality prior to spawning	Number of females spawned
1964	349						16%	182
1965	408						21%	133
1966	1,511						18%	621
1967	974			1,039	0.19%*		11%	581
1968	351	3,416 ^{1/}	0.59%*	740	0.15%*	0.78%*	2%	1,809
1969	672	2,817 ^{1/}	0.56%*	1,043	0.15%*	0.71%*	8%	1,415
1970		6,470	0.44%*	887	0.10%*	0.58%*	10% ^{2/}	3,520
1971		3,357	0.37%*	1,754	0.06%*	0.47%*	19% ^{2/}	1,722
1972		12,310 ^{3/}	0.39%*	943	0.04%*	0.44%*	15% ^{2/}	3,825
1973		17,054 ^{3/}	0.54%*	286	0.001%*	0.57%*	37% ^{2/}	3,454
1974		3,457	0.12%*	538	0.002%*	0.14%*	27% ^{2/}	1,756
1975		4,428	0.15%*	573	0.002%*	0.17%*	7% ^{2/}	2,184
1976		6,342	0.23%*	1,765	0.052%*	0.26%*	15% ^{2/}	3,055
1977		7,767 ^{3/}	0.23%*	437	0.12%*	0.28%*	11% ^{2/}	3,781
Total	4,265	67,418		9,958				28,038
Average	711	6,742	0.36%	905	0.069%	0.44%	15.5%	2,003

^{1/} Excess adults over 2,700 holding capacity at Rapid River were hauled to Stolle Meadows and McCall Hatchery.

^{2/} Mortality to 1970 was the total to the first day of spawning and after 1969 all fish lost prior to their spawning were included as pre-spawning loss.

^{3/} Excesses over 8,000 holding capacity at Rapid River (7,000 in 1977) were hauled to the Little Salmon River, Salmon River and the South Fork of the Clearwater River.

* Total percentage of return was calculated without regard to brood year, that is all of the adults returning in 1977 were assumed to be from the 1973 brood that emigrated in 1975, etc. For percentage return by brood year, consult Table 5.

Table 3 (Cont'd.). Returns of spring chinook salmon to Rapid River Hatchery and production of smolts.

Brood year	Number of eggs per female	Number of eggs taken	Number of smolts released	Year of release	Average length		Number per		Total weight	
					mm	(in)	kg	(lb)	kg	(lb)
1964	4,874	887,000	580,000	1966	121	(4.8)	49.8	(22.6)	11,639	(25,644)
1965	4,541	604,000	480,000	1967	117	(4.6)	51.1	(23.2)	9,383	(20,690)
1966	3,697	2,296,000	1,460,000	1968	116	(4.6)	55.1	(25.0)	26,484	(58,400)
1967	3,537	2,055,000	900,000	1969	118	(4.6)	52.9	(24.0)	17,006	(37,500)
1968	3,671	6,640,000	3,172,000	1970	127	(5.0)	44.1	(20.0)	71,925	(158,600)
1969	3,655	5,151,697	2,718,720	1971	123	(4.8)	46.3	(21.0)	58,711	(129,463)
1970	4,136	14,560,280	2,809,200	1972	128	(5.0)	42.8	(19.4)	56,747	(125,132)
1971	3,507	6,038,785	2,908,425	1973	129	(5.1)	37.5	(17.0)	79,358	(174,989)
1972	3,941	15,072,604	2,707,917	1974	128	(5.0)	38.6	(17.5)	69,005	(152,162)
1973	3,912	13,510,465	3,373,700	1975	137	(5.4)	32.6	(14.8)	105,987	(233,708)
1974	3,924	6,890,186	3,564,640	1976	125	(4.9)	40.6	(18.4)	87,638	(193,206)
1975	3,894	8,503,606	3,170,922	1977	134	(5.3)	35.1	(15.9)	90,986	(200,624)
1976	3,762	11,492,878	2,430,000 ^{4/}	1978						
1977	3,745	14,160,330		1979						
Total		107,882,831	30,575,601						684,869	(1,510,138)
Average	3,914	7,705,916	2,547,969		125	(4.9)	43.9	(19.9)	57,072	(125,845)

^{4/} On hand 1 October 1977 for release in the spring of 1978. They are not included in the total number of smolts released. It does not include the 450,199 fish that weighed 8,850 lb (50.9 per lb) that emigrated from the ponds in August, 1977.

Table 4. Length frequencies of salmon entering the Rapid River trap; 1970-1977.

<u>Length</u>		1970	1971	1972	1973	1974	1975	1976	1977
in	cm								
<u>Third year of life (jacks)</u>									
15	38.1	16	36	53	9	11	5	4	1
16	40.6	45	118	89	20	27	21	50	12
17	43.2	108	182	136	35	80	93	114	28
18	45.7	210	398	196	64	91	114	311	77
19	48.3	190	360	160	59	75	139	463	115
20	50.8	134	292	125	41	53	114	445	110
21	53.3	102	201	113	33	32	41	233	58
22	55.9	41	87	41	13	59	15	75	19
23	58.4	28	42	12	7	37	31	30	7
24	60.9	<u>13</u>	<u>38</u>	<u>18</u>	<u>5</u>	<u>117</u>	<u>69</u>	<u>40</u>	<u>10</u>
Subtotal		887 (12.0%)	1,754 (34.3%)	943 (7.1%)	286 (1.6%)	582 (14.6%)	642 (12.8%)	1,765 (21.8%)	437 (5.3%)
<u>Fourth year of life</u>									
25	63.5	71	108	123	85	70	126	143	84
26	66.0	207	149	382	341	250	377	361	292
27	68.6	472	381	1,009	1,006	379	736	869	879
28	71.1	958	718	2,154	2,473	423	1,106	1,324	1,848
29	73.7	1,410	783	2,938	3,367	273	920	1,224	2,138
30	76.2	1,475	588	2,745	3,104	159	521	858	1,221
31	78.7	<u>1,003</u>	<u>265</u>	<u>1,415</u>	<u>1,978</u>	<u>100</u>	<u>187</u>	<u>443</u>	<u>648</u>
Subtotal		5,596 (76.1%)	2,992 (58.6%)	10,766 (81.2%)	12,654 (73.0%)	1,654 (41.4%)	3,973 (79.4%)	5,222 (64.4%)	7,110 (86.9%)

Table 4 (Cont'd.). Length frequencies of salmon entering the Rapid River trap, 1970-1977.

<u>Length</u> in cm		1970	1971	1972	1973	1974	1975	1976	1977
<u>Fifth year of life</u>									
32	81.3	485	98	726	921	146	110	232	245
33	83.8	214	60	271	717	260	96	217	122
34	86.4	78	59	160	905	376	77	215	92
35	88.9	39	47	98	631	358	51	176	74
36	91.4	33	39	105	716	298	27	151	38
37	94.0	13	25	86	256	190	13	78	26
38	96.5	12	36	98	257	131	12	51	37
or larger									
Subtotal		874 (11.9%)	364 (7.1%)	1,544 (11.7%)	4,403 (25.4%)	1,759 (44.0%)	386 (7.7%)	1,120 (13.8%)	634 (7.8%)
Totals		7,357	5,110	13,253	17,343	3,995	5,001	8,170	8,181

on the Snake River it was 38,770 fish. When the harvest from the sport and Indian fishery in the Little Salmon and Rapid rivers are added to the total numbers of fish that were ponded or planted from the hatchery, we arrive at a total number of fish contributed by this hatchery, 12,205. This is 10.2% of the Bonneville count and 31.4% of the Lower Granite count. The Rapid River contribution at Bonneville Dam increased from 7% in 1976 to 10.2% in 1977 but the Lower Granite Dam percentage dropped from 40% in 1976 to 31.4% in 1977. When the Rapid River fish are subtracted from the Lower Granite figure, we find that only 26,588 spring chinook were available to seed the spawning beds in the wild and to return to other hatcheries in the Snake River drainage.

Nitrogen Bubble Damage and Other Injuries

The absence of moisture in all areas of the west in the winter of 1976-1977 provided very low water conditions in the entire Snake and Columbia River drainages in the spring of 1977. Upstream emigrants faced no nitrogen problem at any point and the result was that we noted practically no fish that had been damaged by Nitrogen Bubble Disease. We classed only 165 fish out of the 8,181 fish handled as being nitrogen damaged, an incidence of only 2% as compared to 3.8% of the run in 1976, 7% in 1975 and nearly 60% in some prior years.

We also recorded all injuries that had been caused by the various fisheries that our fish had been subjected to on their passage from the ocean. In 1975 we saw only 54 fish that had escaped from gillnets and the number increased to 121 fish in 1976. In 1977 we recorded seeing 516 fish with gillnet scars, 6.3% of the total fish handled. The sport and Indian fisheries in the Little Salmon River and Rapid River were more intensive than ever before in the history of this hatchery. The lower water flow conditions also made the fish much more vulnerable than in any past year, with the exception of 1973. We found that some of the injuries seen on the fish were very difficult to pinpoint as to which fishery was the causative factor. Small wounds that appeared to be from snagging with a small hook were classed as snag wounds and large wounds that had been caused by gaff hooks used in the Indian fishery in Rapid River were classed as gaff wounds. We saw 770 fish (9.4% of total run) that had been wounded by being hooked either in the mouth or another portion of the body. We saw 706 fish that had been wounded in the Indian fishery (8.6% of run). This incidence of fresh gaff wounds was a much higher level than ever before experienced. In 1975 we saw 126 gaff injuries and in 1976 we saw 169 wounds. The Indian fishery was very intensive and at times interfered with our trapping operations. On two occasions the entrance to the trap had been totally obstructed. The trap area was fenced with chain link materials in the spring of 1977, so the problems of fishermen attempting to steal fish directly from the trap were minimized. The Indian fishery at the upstream migration barrier became so intensive that it was felt that they could endanger the run if it was allowed to continue. In May, a meeting was held at this hatchery involving Idaho Power Company, the Nez Perce Tribal Executive Committee, legal counsel for the tribe, Director Greenley and Department staff. Idaho Power Company felt that Rapid River should be closed to all fishing, while the Idaho Department of Fish and Game requested that the Tribal Executive Committee adopt a regulation to address the problem. The results of the meeting were good and on 31

May 1977 the Tribal Executive Committee enacted a fishing closure within 30 m (100 ft) of the entrance to the trap and a prohibition upon the sale of the fish taken in the Indian subsistence fishery. Compliance by tribal fishermen was very good and no further difficulties were encountered. The tribal enforcement officer was very helpful at all time and spent a great deal of time in the area.

Timing from Bonneville Dam to the Rapid River Trap

All tags placed by the Oregon Fish Commission at Bonneville Dam were removed at Little Goose Dam, so no information was available in 1977. We suspect that this year's emigration pattern would be very similar to that of 1973.

Holding Pond Losses, Treatment of Adults

All of the returning adult spring chinook were examined at the trap for wounds, tags and brands. Any open wounds or abrasions were swabbed with a strong solution of malachite green and each fish taken to the hatchery was injected with Erthromycin Phosphate at a rate of 11 mg of active drug per kg of body weight (5 mg/lb). The injections of Erthromycin Phosphate were part of the cooperative Kidney Disease study being carried on in conjunction with the University of Idaho. University of Idaho personnel were on hand most of the summer to assist with the injections and record keeping.

All fish taken to the hatchery were placed in the earthen holding ponds. We treated with malachite green flushes at a rate of .5 ppm twice weekly until mid-July when the malachite treatments were discontinued. The malachite flushes were used to control fungus and were satisfactory. Fungus was not a problem after mid-July.

On 5 July 1977 we began reinjecting all adults in the ponds with a second treatment of Erthromycin Phosphate. Dosage levels were again 11 mg/kg (5 mg/lb), the same as the original injection given at the trap. We completed the second injections on 13 July 1977. University personnel were on hand to assist with the entire reinjection process. We had attempted to time the second injection, as nearly as possible, an average of 30 days after the initial injection. Losses to Kidney Disease in the adults prior to spawning showed a marked decrease in 1977. All fish that died prior to spawning were autopsied and the cause of death was recorded on the individual mortality cards.

We lost 758 adult fish in the holding ponds prior to spawning (10.8%) to all causes. Of the 758 fish that died, 563 were females. Our examinations showed that only 31 of the females had Kidney Disease (5.5%) a good decline from the 50 (22.1%) with lesions in 1976. Only 11 of the 195 male mortalities had KD lesions (5.6%). Examinations of spawned out carcasses for lesions was done by NMFS and University of Idaho personnel. They found 48 fish out of 6,443 that they examined had lesions (.74%). In 1976, they had found 6.4% infected fish in their examinations. We feel that the injections of Erthromycin Phosphate are very beneficial and that with the program Kidney Disease has been very well controlled. The program should be continued.

The overall mortality rate declined from 1976 when we lost 14.5% of the fish ponded to 10.8% in 1977. Since the Kidney Disease losses have declined, we feel that the large number of fisheries related injuries contributed to the mortality rate. As previously noted, 1,992 fish (24.3%) had been injured. Of the 758 fish that died in the ponds, 563 were females (74.3%) and 195 were males (25.7%). Of the fish ponded (7,011), females numbered 4,349 (62%) and males numbered 2,262 (38%). Most of the fish planted for the sports fishing were males.

A portion of the run was tested for Ceratomyxa shasta, but no results of that testing is available at this time.

It was also noted that the warm water temperatures that preceeded the Bacterial Gill Disease outbreak in the 1976 brood fish also caused more mortality in the adults. No increase in mortality was apparent in the smaller earthen pond, but the losses in the Columbia River Fishery Programs (CRP) pond, located immediately below the number two rearing pond, did have a corresponding die off. On 28 July 1977 we lost only two fish from both adult holding ponds. On 29 July we had a loss of 118 fish, all but 2 of which were from the CRP pond. Mortalities dropped to 28 the following day, and after the Cutrine Plus treatments in the number two pond (which supplies water to the CRP pond) losses dropped back to 3 or 4 per day.

With out this loss during a period of a few warm water days, prespawning mortalities would have been even further reduced.

i

Spawntaking Operations and Enumeration of Eggs Obtained

Sorting of the adult spring chinook salmon began on 15 August 1977, 4 days later than in the preceeding 2 years, and was completed on 12 September 1977. Very few fish were ripe on the initial sort and during the first week (15 to 19 August) we spawned 83 females and obtained 338,940 eggs (2.4% of the total egg take). During the week of 22-26 August we spawned 535 females and took 2,022,480 eggs, 14.3% of the total egg take. The week of 29 August to 2 September was the peak of the spawning operation as we spawned 1,990 females during the week and they produced 7,805,790 eggs, 55.1% of the total egg take. The week of 5-9 September we spawned 1,147 females and 3,866,400 eggs were obtained, 27.3% of the total egg take. The spawntaking was completed on 12 September when we spawned 26 females and obtained 126,720 eggs, .9% of the total egg take. We released 5 unspawned females and 13 males into Rapid River.

The toal number of eggs taken was 14,160,330 from 3,781 females. We used the milt from 2,455 males to fertilize the eggs. The average number of eggs per female was 3,745, nearly the same as the 3,762 eggs per female in 1976. Only males in their fourth and fifth year of life were utilized in the breeding program. The size of the eggs varied from 3.15 to 3.67 per ml {90 to 104 per oz) throughout the run. This is comparable to past years.

Disposition of Spawned-out Carcasses

After spawning, all carcasses were examined for marks and measured. We disposed of the carcasses by placing about 2,000 in a freezer trailer unit at

the hatchery to be utilized by the Wildlife Bureau in black bear trapping studies. The remainder of the fish were buried on the hatchery property. It should be noted that all available burial space has been filled, and next year carcass disposal will be a problem. We contacted several companies about utilizing the fish for animal feed, but all persons contacted said it was economically unsound to attempt to dry fish for animal feed. This will bear further investigation.

Marked Fish

All of the fish under 61 cm (24 in) were examined for marks as they were taken from the trap. We found nine jacks with adipose clips and coded wire tags that had been placed in the fish prior to emigration in 1976. We marked 136,606 smolts, and had 9 return (.007%) (Table 5). We released 3,222,334 fish that had no marks and 455 of the unmarked fish returned as jacks (0.01%). The total release of marked and unmarked fish was 3,258,940 and a total of 464 returned as jacks (.01%). This was the lowest jack percentage return since 1973. It is unknown at this time if the transportation work being carried on by the National Marine Fisheries Service at the Lower Snake and Columbia River dams will have an impact on the tendency of some of the fish to return as jacks. If it has an effect, then jacks may no longer be an accurate indicator of smolt survival. If the hauling has no effect on the smolt becoming jacks, then we would have to anticipate a poor return of fish in their (fourth year of life in 1978.

The majority of fish that returned to Rapid River were in the fourth year of life. We found that 7,110 fish returned out of a release of 3,373,700 smolts (.21%). Prior to release, 343,278 fish were marked with an "R" brand in the right anterior position in the spring of 1975. We found 272 "R" branded fish (.07%) among the fourth year fish and 6,838 unmarked (.22%) fourth year fish.

Fish in their fifth year of life or older numbered 634 from a release in 1974, or earlier, of 2,707,917 (.02%). In 1974 we branded 100,374 with an "R" brand in the left anterior position from rearing pond one. We found 14 "R" brands in the left anterior position on adults in 1977 (.01%). When we follow these fish through the age groups, we find that 0 jacks with the brands were observed in 1975, (.00%), 89 were found in 1976 as 4-year olds (.09%), and 14 as 5-year olds in 1977 (.01%). In all, 103 left anterior brands from the pond one release returned (.10%). We marked 170,775 fish from pond two with an "R" brand in the right anterior position prior to the 1974 release. We observed 22 fish from this group in 1977 (.01%). Following this group through the age classes, we saw 26 as jacks (.01%), 121 as fourth year fish (.07%) and 22 fish as fifth year fish (.01%). It would appear that there is little difference in the survival rates of fish from the two respective ponds. It was again noted that the unmarked fish apparently survived better than the marked fish as we recovered 547 jacks (.02%), 5,012 as fourth year fish (.21%), and 598 as fifth year fish (.02%). In all instances the unmarked fish returned 2:1 better than marked fish. From the 1972 brood that emigrated in 1974, we recovered 6,157 fish (.25%) of the 2,707,917 at the Rapid River trap that were originally released from the hatchery. It took an average of 421 smolts released to produce 1 adult back to the hatchery. This ratio is not as good as

Table 5. Summary of the returns to Rapid River Hatchery by age class of spring chinook smolts released.1/

Brood year	Year of release	Number released	Type mark	Returns (numbers and percent) by age class						Total		Survival one adult per N smolts
				111	IV		V					
				No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	
1964	1966 (Sp)	51,180	LP*	76	.15	?	?	?	?	?	?	
	1966 (Sp)	536,820	None	963	.18	?	?	?	?"	?	7	
	Combined	588,000		1,039	(22%)	3,422 (73%)	.58	197 (5%)	.03	4,658	.79	126
1965	1966 (Fall)	14,590	RP*	?	?	13	.09	3	.02	?	?	
	1966 (Fall)	14,670	Y(rt)**	?	?	0	.00	8	.05	?	?	
	1967 (Sn)	20,000	LP*	?	?	19	.09	3	.01	?	?	
	1967 (Sn)	20,000	Y(it)**	?	?	0	.00	2	.01	?	?	
	1967 (Sp)	410,730	None	?	?	2,588	.63	856	.21	?	?	
	Combined	480,000		740	(18%)	2,620 (63%)	.55	874(19%)	.18	4,234	.88	115
1966	1968 (Sn)	50,000	LV*	54	.09	348	.70	14	.03	416	.83	
	1968 (Sn)	50,000	Y(rt)	0	.00	97	.19	7	.01	104	.20	
	1968 (Sn)	1,360,000	None	989	.07	5,115	.38	343	.03	6,447	.48	
	Combined	1,460,000		1,043 (15%)	.07	5,596 (80%)	.38	364(5%)	.02	7,003	.48	208
1967	1969 (Sn)	25,000	LV*	48	.19	205	.82	29	.10	272	1.10	
	1969 (Sn)	25,000	R(rt)	1	.01	88	.35	8	.03	98	.40	
	1969 (Sn)	25,000	R&LV*	27	.11	85	.34	5	.02	117	.47	
	1969 (Sn)	825,000	None	811	.10	2,614	.32	1,502	.18	4,927	.60	
	Combined	900,000		887 (16%)	.10	2,992 (55%)	.33	1,544 (29%)	.17	5,416	.60	166
1968	1970 (Sn)	25,000	LV*	5	.02	43	.17	4	.01	52	.21	
	1970 (Sn)	25,000	R(lt)	3	.01	21	.08	4	.01	28	.10	
	1970 (Sn)	25,000	R&LV*	0	.00	6	.02	0	.00	6	.02	
	1970 (Sn)	3,097,000	None	1,746	.06	10,686	.35	4,395	.14	16,827	.54	187
	Combined	3,172,000		1,754	(10%)	10,766 (64%)	.34	4,403 (26%)	.14	16,923	.53	
1969	1971 (Sp)	48,500	N(lt)	12	.02	177	.36	6	.01	195	.40	
	1971 (Sn)	102,000	R(rt)	27	.03	119	.12	15	.01	161	.16	
	1971 (Sn)	99,000	R(lt)	19	.02	212	.21	11	.01	242	.24	
	1971 (Sn)	2,469,200	None	885	.03	12,146	.49	1,727	.07	14,758	.60	
	Combined	2,718,700		943	(67%)	12,654 (82%)	.47	1,759 (12%)	.06	15,35	.56	177
					.0					6		

Table 5 (Cont'd.). Summary of returns to Rapid River Hatchery by age class of spring chinook smolts released^{1/-}.

Brood year	Year of release	Number released	Type mark	Returns (numbers and percents) by age class						Total		Survival one adult per N smolt
				III		IV		V		No.	Per- cent	
				No.	Per- cent	No.	Per- cent	No.	Per- cent			
1970 Combined	1972 (sp)	200,092	Ad-½An	7	.01	54	.02	21	.01	82	.04	1,185
	1972 (sp)	2,609,108	None	279	.01	1,644	.06	365	.01	2,288	.08	
		2,809,200		286(12%)	.01	1,698(72%)	.06	386(16%)	.01	2,370	.08	
1971 Combined	1973 (sp)	201,547	Ad-An	18	.01	233	.12	41	.02	292	.14	496
	1973 (sp)	2,706,876	None	520	.02	3,973	.15	1,079	.04	5,572	.21	
		2,908,425		538(9%)	.02	4,206(72%)	.14	1,120(19%)	.04	5,864	.20	
1972 Combined	1974 (sp)	100,374	LA-R**	0	.00	89	.09	14	.01	103	.10	421
	1974 (sp)	170,775	RA-R**	26	.01	121	.07	22	.01	169	.09	
	1974 (sp)	2,436,768	None	547	.02	5,012	.21	598	.02	6,157	.25	
		2,707,917		573(9%)	.02	5,222(81%)	.19	634(10%)	.02	6,429	.23	
1973 Combined	1975 (sp)	343,278	RA-R**	49	.01	272	.07	Inc.(1978)	--	Inc.	--	
	1975 (sp)	3,030,422	None	1,716	.06	6,838	.22	Inc.(1978)	--	Inc.	--	
		3,373,700		1,765	.05	7,110	.21	Inc.(1978)	--	Inc.	--	
1974 Combined	1976 (sp)	136,606	Ad-CWT*	9	.007	Inc.(1978)		Inc.(1979)	--	Inc.	--	
	1976 (sp)	3,222,334	None	428	.01	Inc.(1978)		Inc.(1979)	--	Inc.	--	
		3,358,940		437	.01	Inc.(1978)		Inc.(1979)	--	Inc.	--	
1975 Combined	1977 (sp)	50,475	RA-R**	Inc.(1978)	--	Inc.(1979)		Inc.(1980)	--	Inc.	--	
	1977 (sp)	254,945	Ad-CWT*	Inc.(1978)	--	Inc.(1979)		Inc.(1980)	--	Inc.	--	
	1977 (sp)	2,865,502	None	Inc.(1978)	--	Inc.(1979)		Inc.(1980)	--	Inc.	--	
		3,170,922		Inc.(1978)	--	Inc.(1979)		Inc.(1980)	--	Inc.	--	

^{1/-} Brands on returning salmon were hard to see, so the records here probably represent recognition rather than survival.

* LP, RP, LV, RV, Ad-½An, Ad-An, signify left or right pectoral, left or right ventral, adipose-½-anal, and Adipose-Anal fin clips. Ad-CWT signifies that the adipose fin was removed and a coded wire tag was placed.

** "Y", "R", and "N" signify brands on left (lt) or right (rt) of the fish. RA-"R", LA-"R" signify that the "R" brand was placed on the fish in either the right or left anterior position. (National Marine Fisheries Service designation)

that recorded for the first 6 years of hatchery operations, but is significantly better than the record low return rate of 1 adult for every 1,185 smolts from the 1970 brood that emigrated in 1972 and slightly better than the 496 smolts to 1 adult ratio for the 1971 brood released in 1973.

Distribution of Eggs, Eye-up Percentages

As the eggs were taken from the adult fish at the hatchery, 6,800,130 were placed in the incubators at Rapid River for eyeing. We shipped 2,633,400 green eggs to Sweetwater Eyeing Station, 2,287,800 green eggs to Kooskia National Hatchery, and 2,439,000 green eggs to Mullan Hatchery; a total of 14,160,330 eggs. We lost 136,003 eggs (2%) prior to eye-up, and had a total on hand at that point of 6,664,127 eggs. We then shipped 250,200 eyed eggs to Mullan Hatchery, 288,000 to Hayden Creek Hatchery and 20,700 eyed eggs to the University of Idaho. An additional 1,007,340 eyed eggs were planted in the Crooked River Hatching Channel (South Fork Clearwater River drainage), leaving a balance on hand for this hatchery of 5,098,587 eyed eggs.

We treated all eggs that were kept at Rapid River and all eggs that were shipped to Mullan Hatchery with 1 ppm solution of Erthromycin Phosphate in an effort to prevent transfer of Kidney Disease bacteria through the eggs. Some studies have shown the bacteria to be egg transmittable. We noted no adverse reaction to the drug and eye-up percentages were as good as any eggs ever before taken at this hatchery.

Part of the eggs that we shipped to Sweetwater were Erthromycin Phosphate treated, but none of the eggs shipped to Kooskia National were treated because of a shortage of the drug. As noted in last year's report, it seemed the treated eggs had slightly less fungus problems than did the untreated eggs. This is another phase of the overall Kidney Disease control project, in co-operation with the University of Idaho. The results appear to be good, as the untreated eggs held at the University of Idaho from the 1976 brood did have an outbreak of Kidney Disease, while the fingerlings from the Erthromycin Phosphate hardened eggs did not. Further testing is being done at this time.

Harvest

Sports fishing for spring chinook salmon was reopened in 1977 after being closed for the past 2 years. The season on the Little Salmon and Salmon rivers (where most of the harvest of Rapid River fish occurs) opened on 21 May 1977, as did the remainder of the salmon waters of the state. On opening morning, a car count taken at 0700 hr revealed that there were 434 cars from the mouth of Rapid River to the City Park at Riggins, 6.5 km (4 mi) area. Every available place to fish was in use.

Creel census harvest information was kept by the Regional Fisheries Manager and Conservation Officers assigned to patrol duty. We also manned a check station at New Meadows on 22 May and information gathered from all sources indicated that about 2,960 anglers had fished a total of 13,025 hours the first 2 days of the season, and they caught a total of 1,416 salmon. Every fisherman contacted reported hooking fish, but many escaped.

The opening of the season coincided with a large surge of fish moving from the main Salmon River up the Little Salmon and into Rapid River. On 21 May we trapped 119 adult salmon, 22 May we had 98 and 23 May was a new all-time 1-day trapping record of 1,065 adults. Shortly after the opening weekend, we began a systematic creel census on a 1 weekend day and 1 week-day, picked at random, for the remainder of the season (Table 6).

Table 6. Little Salmon River chinook harvest estimate, 1977.

Date	Anglers	Hours	Chinook
21-22 May	2,960	13,024	1,416
23-27 May	868	3,819	110
28-30 May	2,062	9,072	212
31 May - 3 June	964	4,240	65
4- 5 June	757	3,330	105
6-10 June	361	1,125	66
11-12 June	241	730	69
13-17 June	50	750	59
18-19 June	30	240	17
Totals	8,293	36,330	2,119*

* Includes jack harvest and 128 fish planted in section II that were surplus to hatchery needs.

Each angler fished an average of 4 hours and 23 minutes and caught a fish for every 17.1 hours of fishing time. The season average was 1 fish for every 4 anglers (.26 fish/angler).

Approximately 66% of the fish harvested were caught on opening weekend. Success remained good the second weekend but declined from that point for the remainder of the season. After 19 June, fishermen turned to trout fishing and we discontinued census because we could not find any fishermen to check.

We planted 595 adults and 303 jacks in the Little Salmon River above the mouth of Rapid River in what we called section II of the Little Salmon River. Fishing in section II is dependent upon plants of surplus adults from the hatchery, while section I, below the mouth of Rapid River, is entirely dependent on fish migrating up Rapid River to the hatchery. Of the fish planted in section II, 128 were caught by fishermen (14.3%).

The Indian fishery on the Little Salmon and Rapid rivers was more intensive than any year to date. Water flows were low all year in both rivers and the

fish were vulnerable to their fishing methods. Conservation Officers and hatchery personnel checked a total of 670 fish in the Indian creel and we estimated that we had checked 33% of the fish that were actually taken (Bross, Theitten, personal communication). We estimated that the Indian harvest from the Rapid River hatchery fish was 2,010 fish, nearly equal to the non-Indian harvest of Rapid River fish in the Little Salmon and Salmon Rivers.

Of the total return of fish destined for Rapid River Hatchery, 12,205, fishermen caught 4,001 (33.6%).

Summer Chinook -- Returns to Rapid River

Between 30 June and 1 August 1977, when trapping was terminated, we released 135 adult fish and 51 jacks upriver from the trap. These fish were considered to be summer chinook, but undoubtedly some late arriving spring run fish were included. This is a decrease from the fish released in 1976 as summers, when 226 adults and 96 jacks were released but is slightly higher than the 1975 summer run of 108 adults and 4 jacks. The majority of the late arriving fish were slightly larger than the fish classed as springs.

Steelhead

The trap was not installed until 23 April 1977 because of construction work on the trap and ladder. The first steelhead arrived at the trap on 25 April. We transported a total of 60 fish to a point upstream from the hatchery and released them back into Rapid River between 25 April and 8 June 1977..

This number is up slightly from the 57 steelhead passed in 1976 and the 58 passed in 1975. It is, however, much below the 221 steelhead that passed in 1972.

Indian fishermen harvested at least 5 steelhead from Rapid River in 1977, 10% of the total run. No fish were held at the hatchery in 1977.

Inventory of Miscellaneous Species in Rapid River

Dolly Varden

During the time that the trap was in operation, we passed 212 Dolly Varden that were in excess of 203 mm (8 in) in length. This low number represents a decrease to slightly more than half of the number trapped in 1976 (414).

Whitefish

The whitefish population continued its drastic decline this year with only 19 being trapped, the same number as during 1976. This figure compares poorly with the 53 captured in 1975 and 274 in 1974.

Other Species

In addition to the species listed above, we trapped and counted one cut-throat trout and nine rainbow trout. In past years a few suckers were counted at the Rapid River trap but this year none were captured. We counted three northern squawfish, *Ptychocheilus oregonensis* (Richardson), at the trap. The alarming fact here is that this is the first recording of squawfish being trapped in Rapid River.

McCall Summer Chinook Enumeration (Funded by the U.S. Army Corps of Engineers)

On 22 June we traveled to Little Goose Dam near Starbuck, Washington for the purpose of selecting summer chinook from the fish passage ladder at the dam. The eggs from these fish were to be used to enhance the summer chinook population in Idaho. A total of 706 salmon were selected at the dam, given injections of Erythromycin Phosphate and Spectinomycin and then swabbed with a strong solution of malachite green if open sores existed. We loaded the fish by hand into large tanker trucks and transported them non-stop to Rapid River. Due to an overloading of the trap at the dam on two occasions some of the fish arrived in much poorer condition than expected. Several of the fish jaundiced shortly after arrival and died within a few days. Cause of the jaundice was suspected to be *Ceratomyxa shasta*, and samples taken are under analysis. It may also be that the jaundice was caused by an adverse reaction to the simultaneous injection of the two drugs. This practice may have to be discontinued in the future. Early arrival of the summers and their selection approximately 3 weeks earlier than in the past, made sexing of the fish a difficult task. Of the 706 fish selected, 54% (382) were females.

Spawntaking, Enumeration of Eggs, Eye-up and Distribution

Prior to spawntaking operations (19 August to 24 September) we lost 228 females and 166 males. During spawntaking we utilized 154 females and 158 males to obtain 615,762 eggs, an average of 3,998 eggs per female. As the eggs eyed, they were cleaned and shipped to McCall Hatchery for hatching and rearing. A total of 613,502 eyed eggs were shipped to McCall accounting for an eye-up/shipment percentage of 99.6%.

Hatchery Improvements -- 1977

Improvements to the hatchery this year include installing a chain link fence around the trap compound, removing the back wall of the trap, installing new concrete checks below the trap, building a native stone stairway from the park to the upper level by the house and placing new concrete curbing in the visitor parking lot. The fencing was installed by the hatchery crew with assistance from other Department personnel. The trap remodeling was accomplished by the Engineering crew and the remainder of the work was accomplished by hatchery personnel.

Public Relations

During 1977, nearly 42,000 people visited the hatchery and trap installations. This increase in visitors over last year is undoubtedly due to the sport fishing

season on chinook salmon this year.

Hatchery personnel made presentations to the Idaho County Historical Society, McCall Jaycees, a class of Senior Wildlife and Range students from the University of Nevada (Reno), as well as to several classes from area schools and Senior Citizens groups from as far away as Boise. The vast majority of visitors to the hatchery were given tours and we were very pleased to host talks with groups representing the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the Oregon Fish Commission, the Washington Department of Fisheries, the Nez Perce Indian Nation, the Idaho Power Company and the Moore-Clark Company.

ACKNOWLEDGEMENTS

The hatchery crew would like to thank the following people for help so willingly given this past year: Joe Bross, Boyd Thietten, Heyward Jack, Brent Hyde, John Gahl, Bill Doerr, Mel Prince and Brad Christensen for their help during construction of the trap fence; Bill Klontz, Ph.D., Jim Chaco, Travis Coley, and other students from the University of Idaho for their help during injecting, sampling and testing and spawning; Wendell Smith of the Idaho Power Company for his constant help; and, finally, the crew from Kooskia National Hatchery, Bill Doerr of McCall Hatchery, Tom Levendofsky of Pahsimeroi Hatchery and Jerry Mowery of Niagara Springs Hatchery for their valuable service during the trapping and spawning season.

Submitted by:

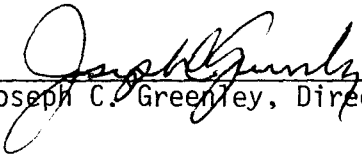
Submitted by:

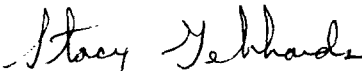
Evan M. Parrish
Fish Hatchery Superintendent III

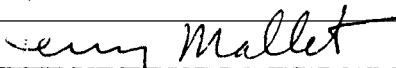
Approved by:

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME


Joseph C. Greenley, Director


Stacy Gebhards, Chief
Bureau of Fisheries


Jerry Mallet
Fishery Research Supervisor
Bureau of Fisheries